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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/617,107	07/09/2003	Gary A. Brist	42P12136C	2613

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EXAMINER

DUONG, KHANH B

ART UNIT PAPER NUMBER

2822

DATE MAILED: 08/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/617,107

Applicant(s)

BRIST ET AL.

Examiner

Khanh B. Duong

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5,11,28-31 and 33-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 11,31,35 and 36 is/are allowed.
- 6) ☒ Claim(s) 1-5,28-30 and 34 is/are rejected.
- 7) ☒ Claim(s) 33 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 July 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

This office action is in response to the amendment filed May 23, 2005.

Accordingly, claim 32 was cancelled, claims 1 and 11 were amended and new claims 35 and 36 were added.

Currently, claims 1-5, 11, 28-31 and 33-36 are pending in the application.

Response to Arguments

Applicant's arguments filed May 23, 2005, with respect to the amended claim(s) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn.

However, upon further consideration, a new ground(s) of rejection is made in view of Fujimoto et al. (US 5,829,125).

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "alloy is formed entirely below the bottom surface of the layer of first material" (emphasis added) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered. In this case, **FIG. 2** only shows the alloy layer 225 as partially below the bottom surface of the layer 177 of first material.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing

should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various

claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-3, 5, 28-30 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pan (US 4,983,250) in view of Fujimoto et al. (US 5,829,125).

Pan discloses in Figs. 1-3 a method comprising: applying photo-thermal energy 20 via laser beam to a layer 18 of first material (a metal) disposed on a layer 16 of second material (a metal) to diffuse a portion of the first material 18 into the second material 16, wherein applying the photo-thermal energy 20 forms desired pattern of electrically conductive traces 22 and 24; and removing non-diffused portions of the layer of first material 18 [see col. 3, line 1 to col. 4, line 8]. Pan further discloses the interdiffusion between layer 18 and layer 16 could, alternatively, extend through the entire thickness of layer 16 so that the conductive traces 22 and 24 contact the layer of material beneath layer 16 [see col. 3, lines 52-56]. Thus, the conductive traces 22 and 24 are expressly understood as being formed “entirely” below the bottom surface of the layer of first material 18.

Re claims 1-3, 5, 28-30 and 34, Pan fails to disclose the laser beam penetrating beyond the layer 18 of first material and into the layer 16 of second material, wherein the laser beam comprises one of a YAG laser, a CO₂ laser or an infrared laser.

Fujimoto et al. (“Fujimoto”) teaches in FIG. 16 the laser beam 7 penetrating beyond the first material 4 and into the second material 24, wherein the laser beam 7 comprises one of a

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YAG laser, a CO₂ laser or an infrared laser [see col. 3, lines 53-55 and col. 8, lines 64-67]. Since Fujimoto discloses the laser beam 7 penetrating beyond the first material 4 and into the second material 24 [see col. 8, lines 64-67], it is inherent that the laser beam 7 causes a portion of the second material 24 to ablate into a plasma.

Since Pan and Fujimoto are from the same field of endeavor, the purpose disclosed by Fujimoto would have been recognized in the pertinent prior art of Pan.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the process of Pan as taught by Fujimoto, since Fujimoto states at column 9, lines 1-3 that the penetrating laser beam would heat and melt the second material 24.

Furthermore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to optimize and select the appropriate widths for the laser beam and the electrically conductive trace. The selection of parameters such as energy, power, concentration, temperature, time, depth, thickness, etc., would have been obvious and involve routine optimization which has been held to be within the level of ordinary skill in the art.

“Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may be impart patentability to a process if the particular ranges claimed produce new and unexpected result which is different in kind and not merely degree from results of prior art ... such ranges are termed ‘critical ranges’ and the applicant has the burden of proving such criticality ... More particularly, where the general conditions of a claim are disclosed in the prior

art, it is not inventive to discover the optimum or workable ranges by routine experimentation”.

In re Aller, 105 USPQ 233, 235 (CCPA 1955). See also MPEP 2144.05.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pan and Fujimoto as applied to claims 1-3, 5, 28-30 and 34 above, and further in view of Mori et al. (US 5,821,627).

Re claim 4, Pan and Fujimoto together disclose the first material includes tin and the second material includes copper. However, Pan and Fujimoto fails to disclose the electrically conductive trace includes a copper tin alloy.

Mori et al. (“Mori”) suggests performing solid-phase diffusion bonding between two metals including copper and tin [see col. 9, line 5 to col. 10, line 64].

Since Pan, Fujimoto and Mori are from the same field of endeavor, the purpose disclosed by Mori would have been recognized in the pertinent prior art of Pan and Fujimoto.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Pan and Fujimoto by forming a copper tin alloy as suggested by Mori, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

Allowable Subject Matter

Claim 33 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 11, 31, 35 and 36 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: none of the prior art of record, taken alone or in combination, fairly shows or suggests all the limitations as claimed.

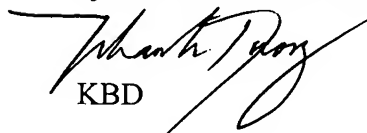
Re claim 11, none of the prior art of record fairly discloses, in combination with other limitations, the steps of: applying photo-thermal energy via laser beam to the diffusion layer to diffuse a portion of the diffusion layer into the metal layer, wherein the laser beam penetrates beyond the diffusion layer and into the metal layer; and removing non-diffused portions of the diffusion layer by chemical mechanical polishing.

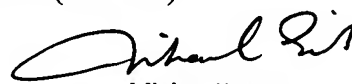
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh Duong whose telephone number is (571) 272-1836. The examiner can normally be reached on Monday - Thursday (9:00 AM - 6:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


KBD


Michael Trinh
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